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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/033,799	01/03/2002	Hong Kui Yang	01-761 72204 (6653)	8521

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EXAMINER	
CHOW, CHARLES CHIANG	
ART UNIT	**PAPER NUMBER**
2685	

DATE MAILED: 08/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/033,799	YANG, HONG KUI	
	Examiner	Art Unit	
	Charles Chow	2685	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 December 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3 and 4* is/are rejected.

7)☒ Claim(s) *2 and 5-7* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Detailed Action

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. The Title does not describe any thing about the FIR filter characteristics and the phase equalizer.

Drawings

2. The drawings are objected to because the symbol for antenna in Fig. 1 should be connected to the output of DAC 108, instead of connected to baseband processor 102. Corrected drawing sheets are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lehman et al. (US 6,282,184 B1) in view of Oler et al. (US 6,031,866).

Regarding **claim 1**, Lehman et al. ((Lehman) teaches a digital CDMA wireless communication system ((Fig. 2, col. 6, lines 33-47) comprising a plurality of transmitters (each base station transceiver having transmitter 107), one or more of the transmitter comprising a base station baseband processor (base band DSP 20-22, Fig. 2), a finite impulse response FIR filter (CSD FIR 123 of the CDMA TX channelizer bank 23, Fig. 9), and a digital to analog DAC converter (108), a plurality of receivers (receiver 40 for each base station), one or more of the receiver comprising an analog to digital ADC converter (41), a FIR filter (SD FIR 64 of the CDMA RX channelizer 7, Fig. 6), and a receiver baseband processor (baseband DSP 13-15). Lehman teaches the "receiver FIR filter being matches to said transmitter FIR filter" so that the received signal from the transmitter can be properly processed by the receiver. Lehman fails to teach the pre-distortion phase equalizer, receiver phase equalizer, and the receiver phase equalizer is matched to the pre-distortion phase equalizer. However, Oler et al. (Oler) teaches the predistortion phase equalizer (the pre-equalizer 16 of transmitting section of base station, Fig.1, the phase pre-coding for the phase equalizing in col. 2, lines 3-21), the receiver equalizer (base equalizer 28 of base station, Fig.

1, the remote equalizer 128 of the remote transceiver 110, Fig. 2), the receiver phase equalizer is matched to the pre-distortion phase equalizer (the coefficients of the forward filter 16 in pre-equalizer 12 of the transmit section is the same as the coefficients of the forward filter 34 of base equalizer 28 in the receiving section 14, col. 5, lines 59-67; the reciprocity property relationship for the filter coefficients for the transmit section 12 to filter coefficients of the receive section 14 in col. 3, lines 26-32; the remote equalizer 128 and the base equalizer 28 are utilizing the same method for calculating the filter coefficients, col. 7, lines 29-62). Besides, the "receive phase equalizer is matched to said pre-distortion phase equalizer" so that the received signal from the transmitter can be properly processed by the receiver. Oler teaches the simple, reduced computational complexity by having the transmitting section's pre-equalization coefficient to be the reciprocity of the equalization coefficient in the receiver (col. 3, lines 26-32). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Lehman with Oler's filter coefficients for transmitter is reciprocity of the filter coefficients for receiver, such that such that the filtering of the interference signal could be simply, efficiently performed by reducing the computational complexity.

Regarding **claim 3**, Oler taught above in claim 1 the transmitter predistortion phase equalizer and the receiver phase equalizer are constraine $Hrxeq(z) = Htxeq(z^{-1})$ in the Z domain (the reciprocity property relationship of the filter coefficients for the transmit section 12 to filter coefficient of the receive section 14 in col. 3, lines 26-32; the remote equalizer 128 and the base equalizer 28 are utilizing the same method for calculating the filter coefficients in col. 7, lines 29-62).

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lehman in view of Oler, as applied to claim 3 above, and further in view of Choi et al. (US 2003/0214,926 A1). Regarding **claim 4**, Lehman and Oler fail to teach the claimed transfer function for the phase equalizer. However, Choi et al. teaches applicant's claim 4, the phase equalizer (205) having transfer function of $H_{eq}(z)$, ao=b2, a1=b1, a2=b2 [0079-0086]. Choi fails to teach the reducing of the noise interference associated with pilot signal generation [0014-0018], by utilizing FIR filtering [0030-0079] for an improvement by reducing the interference. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Lehman above with Choi's transfer function for the phase equalizer such that the noise interference could be reduced by the FIR filter having transfer function provided by Choi.

Claims Objection

5. Claims 2, 5-7 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior arts fail to teach the linear phase and odd symmetry about half the inter-chip frequency; the H(z) =Htx(z) Htxeq(z)Hrx(z)Hrxeq(z).

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

   A. (US 5,896,306), April 1999, Aschwanden teaches the phase distortion equalizer (phase correction A/B for correction the phase error caused by the group delay from the output of

the FIR low pass filter LPF A/B; abstract, col. 2, lines 28-41; col. 5, lines 4-19; col. 6, lines 32-44).

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles Chow whose telephone number is (703)-306-5615.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Urban, can be reached at (703)-305-4385.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to: (703) 872-9306 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

Charles Chow C.C.

August 5, 2004.

EDWARD F. URBAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600